

Technical News Bulletin

of the
National Bureau of Standards

★ Issued Monthly ★

Washington

February 1941¹

Number 286.

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FREDERICK J. BATES BECOMES CHIEF OF OPTICS DIVISION

Dr. Clarence A. Skinner, chief of the Optics Division of the Bureau since July 1, 1919, retired on January 31. He is succeeded by Frederick J. Bates, for many years in charge of the Polarimetry Section. Mr. Bates became connected with the Bureau in 1903, when he was detailed from the Customs Service of the Treasury Department in connection with the control of the apparatus and methods of the laboratories for testing imported sugars. He is the inventor of the Bates saccharimeter and is internationally known in the fields of sugar technology and polarized light. Mr. Bates has played a leading part in the activities of the International Commission on Uniform Methods of Sugar Analysis and was largely responsible for its rehabilitation and reorganization after the World War. He has been president of the Commission since 1932.

¹ Published with approval of the Director of the Budget.

RADIATION FROM FLUORESCENT CENT LAMPS

The new fluorescent lamps, now coming into extensive use, are made up of a glass tube lined with a thin film of a substance that is excited to fluorescence by the ultraviolet rays emitted when an electric discharge is passed through mercury vapor within the tube.

If the lamp were made of clear quartz or of certain kinds of glass, the radiation from the electric arc discharge through mercury vapor, being very strong in the spectral region 2,537 Å to 2,804 Å, might cause conjunctivitis, and would have a highly germicidal effect.

In response to repeated inquiries concerning the ultraviolet emission from these lamps, the Radiometry Section of the Bureau has examined several makes and colors, including daylight (white), red, gold, green, blue, and pink, as well as a lamp having one half of the tube lined with blue fluorescent material while the other half was of clear glass. The lamps were all of the 115-volt, 15-watt type.

It was found that all the tubes were made of a kind of glass that is highly opaque to short ultraviolet wavelengths; moreover, the fluorescent lining (especially in the red gold, and pink-colored lamps) increased the opacity of the glass to ultraviolet radiation of wavelengths shorter than about 3,000 Å.

The shortest observable wavelength emitted by any of the lamps was found to be the mercury line at 3,132 Å. This emission line was weak in the daylight, green, blue, and pink lamps, and in the clear tube, and was not observed at all in the red and in the gold-colored lamps. The ultraviolet emission line of mercury at 3,663 Å was present, but weak, in all the lamps except the gold one. These ultraviolet emission lines are of wavelengths that occur in sunlight, and appear to be harmless in the fluorescent lamps, as used.

By means of a tantalum photoelectric cell, having a maximum sensitivity at 2,537 Å, check measurements were made against a "cold quartz" mercury arc, which is regularly used as a standard of germicidal ultraviolet radiation. In comparison with the standard lamp, it was estimated that, to 1 part in 50,000, no radiation of wavelength 2,537 Å could be detected at a distance of 10 cm (4 inches) from the fluorescent lamps.

From these observations it appears that no ultraviolet radiation of wavelengths shorter than 3,000 Å (not in sunlight) emanates in appreciable amounts from fluorescent lamps as used for illumination.

DISTRIBUTION OF OZONE IN THE STRATOSPHERE

Measurements of ultraviolet solar radiation intensities in the stratosphere, made during 1937 and 1938, were reported by W. W. Coblentz and R. Stair in *J. Research NBS* 22, 573 (1939) RP1207. A paper by the same authors describing similar measurements during the summers of 1939 and 1940, using improved apparatus, will appear as RP1367 in the *Journal of Research* for February 1941.

The apparatus that was transported aloft by unmanned balloons consisted of the following elements: (1) A photoelectric cell and filter radiometer, connected with a balanced amplifier, relaxation oscillator, and radio transmitter for measuring the ultraviolet intensities; (2) a radio-operated barometer, giving the heights attained by the apparatus; and (3) an electrolytic resistor for measuring the ambient tem-

perature of the ultraviolet intensity meter.

The audio-frequency modulated radio wave, giving (1) the intensity of the incident ultraviolet solar radiation, (2) the elevation of the apparatus, and (3) the temperature of the ultraviolet meter, was received and graphically recorded at a fixed ground station (*J. Research NBS* 20, 185 (1938) RP1075).

In three successful flights made in June 1939, and in two similar flights in 1940, the ultraviolet radiometer attained heights ranging from about 78,000 to about 88,000 feet (23 to 27 km). From the observed change in filter transmissions of ultraviolet solar radiation with elevation, it is deduced that the apparatus passed through 65 to 70 percent of the ozone, and other ultraviolet-absorbing constituents, if any, in the upper atmosphere, most of which are localized in a layer extending from 15 to 27 km, with a wide maximum of concentration at a height of about 24 to 25 km, above the earth's surface. At the highest elevation attained by the instruments, the intensity of the ultraviolet solar radiation of wavelengths shorter than 3,132 Å was 10 to 12 times that observed at sea level.

OBLIQUE-INCIDENCE RADIO TRANSMISSION AND THE LORENTZ POLARIZATION TERM

The question as to which of two electron theories applies in the study of the ionosphere (the region of ionized layers of the earth's upper atmosphere) has been much discussed during the past 10 years. The difference between these theories centers in how much of the force exerted on an electron by an electromagnetic wave is the result of displacement of other free electrons nearby by the same wave. Specifically a constant a appears in the force equation, which has the value 0 on one theory (the Sellmeyer theory) and can have the value $1/3$ in the other theory (the Lorentz theory).

The maximum usable frequencies for ionospheric radio transmission calculated on the two theories are different. For given ionosphere conditions, the maximum usable frequencies calculated on the Lorentz theory may be as much as 19 percent greater than those calculated on the Sellmeyer theory. It should thus be possible to distinguish between the theories by comparing theoretical and observed maximum usable frequencies. The results of such experiments are reported in a paper (RP1363) by Newbern Smith in the February

Journal of Research, and the conclusion is that, at least for these experiments, the Sellmeyer theory, where $a=0$, is the correct one.

In connection with the calculation of maximum usable frequencies, it is often necessary to solve an integral equation involving true and virtual heights in the ionosphere, as well as the height of reflection and the height of the equivalent triangular path in oblique-incidence radio transmission. A step-by-step method of performing this solution is also given in the paper.

RECENT APPLICATIONS OF RADIO TO WEATHER REPORTING

A paper entitled "Recent applications of radio to the remote indication of meteorological elements," has been prepared by Harry Diamond for publication in *Electrical Engineering*.

A discussion is presented of radio methods and equipment developed in this country and abroad for extending the geographical boundaries within which routine weather observations may be made, i. e., by remote indication of the measuring instruments. The methods are classified according to the means employed for translating the response of the measuring instruments into variations of some characteristic of the radio signals whereby remote indication is provided at a radio receiving station. Advantages and disadvantages of the several methods are outlined.

The two principal applications of such methods are the radio sonde, for upper-air weather observations, and the automatic weather station, for observations at remote, isolated locations. The measurements required in these two classes of service, and what has already been accomplished in supplying them are outlined.

RAPID METHOD FOR DETERMINING ASCORBIC ACID CONCENTRATION

In the course of investigations at the Bureau for the Florida Citrus Commission on the effect of citrus fruits upon the human organism, it was found necessary to develop a method of determining the vitamin C content of the blood of a large number of individuals in a short time. As described in RP1364 by M. A. Elliott, A. L. Sklar, and S. F. Acree in the *Journal of Research* for February, blood samples from 140 men were regularly used in this work. Seventy of these were being

fed $1\frac{1}{2}$ grapefruits per day and had high ascorbic acid concentrations in the blood, while the remaining 70 were on the same diet, except for the lack of citrus fruit, and had a low ascorbic acid concentration. The plasma is not deproteinized, but is diluted with 5-percent acetic acid and used directly in a specially constructed photoelectric comparator with the dye 2,6-dichlorophenolindophenol. The ascorbic acid content of the plasma sample is read directly from empirical calibration curves determined by adding known amounts of ascorbic acid to blood plasma. The comparator is operated so as to compensate automatically for the usual variation in the turbidity and color of plasma samples. While the method is quite rapid once it is in operation, some time must be spent in preparing calibration curves. The maximum total error in the determination on plasma samples containing from 0 to 3.5 mg of reduced ascorbic acid per 100 ml of plasma was estimated to be ± 0.1 mg/100 ml.

BOILING POINTS OF SOME ORGANIC LIQUIDS

In the *Journal of Research* for February (RP1365) Edgar Reynolds Smith describes his use of the comparative method of Świątosławski, with water for the reference standard, to obtain data from which were developed the following equations to express the relationship between temperature and vapor pressure in the range of pressures from 100 to 1,500 mm Hg.

For benzene,

$$\log_{10} p = 6.905216 - \frac{1211.215}{220.870 + t}$$

For 2,2,3-trimethylbutane,

$$\log_{10} p = 6.799682 - \frac{1204.997}{226.615 + t}$$

For 3-ethylpentane,

$$\log_{10} p = 6.873058 - \frac{1249.825}{219.595 + t}$$

For 2,2,4,4-tetramethylpentane, no convenient single equation was found to fit the data with satisfactory accuracy over the entire range of pressures. By dividing the data into two ranges, satisfactory reproduction was obtained with the following two equations:

(a) From 100 to 450 mm,

$$\log_{10} p = 6.643408 - \frac{1231.620}{204.975 + t}$$

(b) From 430 to 1,500 mm.,

$$\log_{10} p = 6.860684 - \frac{1368.925}{221.679 + t}$$

In these equations, p is the vapor pressure in standard millimeters of mercury exerted by the substance at the temperature t in degrees centigrade.

LIQUID SURFACES AS STANDARDS OF SPECULAR GLOSS

The polished surfaces of black glass plaques have in the past been used as working standards of specular gloss because of their ready availability and because it is possible to compute the gloss of each plaque from its refractive index.

Specular gloss or specular reflectance is usually expressed as the fraction of light specularly reflected by a surface under specified angular conditions of illumination and viewing. Such reflection occurs at the surface of an object, and any change in the physical character of the surface will affect its value. Thus the scratching of a black glass plate in daily use has been found to reduce its specular gloss significantly over a period of time. Therefore, in the case of such an investigation as one now under way at the Bureau, wherein the slow changes in specular gloss of a number of porcelain enamel panels exposed out of doors for a term of years are being measured with the multipurpose reflectometer, a readily and accurately reproducible standard is needed.

To fill this need, a method has been devised for using the surface of a liquid film as the standard. The film is formed by flowing the liquid over the rough-ground or sandblasted face of a black ceramic body. The specular gloss of the film is computed from the angle of reflection and the refractive index of the liquid by means of Fresnel's equation. Monochlorobenzene is suggested as a suitable standard, but several other liquids can also be used.

MICROSCOPIC STRUCTURE OF THE COTTON FIBER

A knowledge of the structure of the cotton fiber must be the basis of any intelligent application of the many processes which the fiber may have to undergo in the manufacture of yarns and fabrics. Accordingly, any new information concerning the structure of the fiber may have important practical results.

The cell of the cotton fiber has a primary and a secondary wall. The primary wall is considered to be the

outer sheath of the fiber, or the portion of the wall formed as the fiber increases in length. Secondary wall refers to that part of the wall which is laid down after the fibers cease to elongate appreciably. Only the thin primary wall encloses the protoplasm of the cotton fiber during the first 15 to 20 days after its origin. Thereafter, the thickness of the wall is increased by a deposition of cellulose which comprises the secondary wall.

The present investigation, conducted by Charles W. Hock, Robert C. Ramsay, and Milton Harris, research associates of the Textile Foundation at the Bureau, is concerned with the structure of the cotton fiber as observed after various purifying and swelling treatments. The fibers were examined in ordinary and in polarized light. In carrying out microscopic investigations of this sort, the question often arises whether the structures which are seen are real. For example, are the apparent fibrils, which may be observed under various conditions of illumination, real structures, or are they merely the result of surface irregularities or diffraction phenomena? To aid in answering such questions, a micromanipulator can be of great help. This instrument makes possible the precise mechanical control of fine glass needles (about 0.0001 inch wide at the tip) whereby fibers can be dissected, flattened, stretched, and otherwise handled so as to clarify their details.

As explained in RP1362 in the February Journal of Research, the wall of a mature cotton fiber appears to have the following structure. The secondary wall, which comprises the bulk of the fiber, consists of innumerable spirally oriented cellulose fibrils enclosed by a winding which also makes a steep spiral, but in the opposite direction from the former. The winding and the fibrils reverse their direction at frequent intervals, their points of reversal being coincident. The secondary wall is enclosed by a thin primary wall which covers the former like a sausage casing. The primary wall is made up of fine criss-crossing strands of cellulose embedded in a membrane consisting principally of wax and pectic substance. The lumen, or central cavity, also contains wax and pectic materials, plus various amounts of degenerated protoplasm.

When cotton fibers are swollen under certain conditions a layered structure is discernible in the secondary wall. As seen in cross sections the wall appears to be made up of concentric cylinders of cellulose. The number of these cylinders increases with the age of the fiber.

In certain reagents, such as cuprammonium hydroxide and trimethylbenzylammonium hydroxide, the fibers often swell irregularly along the axis, and thereby give rise to so-called "balloons." When many balloons are formed in a single fiber the latter has an appearance resembling a string of beads. The formation of these structures upon swelling appears to be dependent in part on the orientation of the fibrils, and in part on the constricting influences of the outer winding and of the primary wall.

A GUIDE TO THE LITERATURE ON RUBBER

A revised edition of the Bureau's guide to the literature on rubber is now available as Letter Circular LC626.

Current books, periodicals, Government documents, etc., are briefly reviewed, and many of the agencies all over the world that deal with rubber and issue publications on the subject are listed.

While in no sense an exhaustive bibliography, this Letter Circular should prove valuable in indicating where to look for a given class of material. It will undoubtedly save time for the layman, the business executive, and the specialist who may wish to consult a publication outside his immediate field. The comments on the items listed will prove particularly valuable to teachers and students.

Copies will be sent on request to those having a real need for the information. Inquiries should be addressed to the Rubber Section, National Bureau of Standards, Washington, D. C.

BASIC SHEET SIZES FOR PAPER

Simplified Practice Recommendation R22-40, Paper, the second revision of this recommendation, establishes basic sheet sizes for bond and writing papers, rag content and sulphite; ledgers, rag content and sulphite; loose-leaf ledgers, rag content and sulphite; machine-posting ledgers, rag content; book paper, uncoated, coated two sides, coated one side, and offset; index bristol; and cover paper.

This revision represents the results of studies of current requirements in the paper consuming trades, made by the Book Paper Manufacturers Association and the Writing Paper Manufacturers Association, and differs from the previous edition in that the broad classes of paper have been subdivided in those cases where the sizes of papers of different substance or finish are not the

same throughout the class. In addition, the scope of the program has been enlarged to cover loose-leaf and machine-posting ledger papers.

The simplification of sizes of basic paper sheets started with the appointment in 1921 of seven committees of the paper industry to make studies of the various phases of paper standardization. From the information thus obtained, a simplified list of paper sizes was drafted in 1923 by a general conference of manufacturers, distributors, and users of paper, and in 1924 this list was promulgated as Simplified Practice Recommendation R22. The standing committee in charge reaffirmed the recommendation without change in 1927 and 1929, and revised it for the first time in 1933. The present revision, which became effective on December 31, 1940, was approved by the standing committee, whose members represent firms and associations concerned with the manufacture and distribution of paper, and publishing, advertising, purchasing, printing, and allied interests.

The complete publication will contain, in addition to the simplified schedule of sizes and varieties of paper, a brief history of the project, and lists the members of the standing committee and acceptors of the recommendation. Until the printed issue is available, free mimeographed copies may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

CORROSION PITTING OF ALUMINUM BRONZE AND MONEL METAL IN WATER

The influence of stress on the corrosion pitting of aluminum bronze and monel metal under water has been investigated by D. J. McAdam, Jr., and Glen W. Geil. This work is described in the February Journal of Research (RP1365).

Corrosion pits in steel are free to assume a roughly hemispherical form. This is also true of monel metal, but is not the case with aluminum bronze, because the pits are confined between crystallites of the alpha phase. Pits in aluminum bronze and monel metal are much smaller than those in steel, but cyclic stress tends to increase both their size and sharpness, a sufficiently high combination of stress, cycle frequency, and corrosion time causing fissures to develop from blunt pits. Fissures in aluminum bronze generally are oblique, whereas those in steel and monel metal

tend to be perpendicular to the direction of the principal tensile stress.

The effective stress concentration that causes the lowering of the fatigue limit depends on the size and sharpness of the pits. The curves of decrease of the fatigue limit with corrosion time are of the "accelerated damage" type, and are obtained when the corrosion rate is anodically controlled. With these two alloys, therefore, the pits in a specimen have a wider range of size and sharpness than the pits formed under cathodic control, as in steel. The pit that caused the lowering of the fatigue limit sometimes is much larger and sharper than the pits found in the sectional views, and for this reason, the damage may be greater than the sectional views would indicate. Many of these views, however, give good correlation with the resultant fatigue limits.

Steady stress tends to accelerate corrosion of aluminum bronze, but steady stress of any attainable value has no apparent effect on the corrosion pitting of monel metal.

PLUMBING MANUAL

A manual of recommended plumbing practice, prepared by a committee representing Federal agencies most concerned with the subject, has been published as Building Materials and Structures Report BMS66. The committee has taken into consideration available recommendations of other bodies, and results of research performed in the Bureau's laboratories. Part I is an introduction explaining the origin of the work. Part II contains recommendations regarding necessary sizes of piping, precautions against pollution of water supply, permissible types of venting, and other matters customarily covered in plumbing codes. Part III gives information useful in applying the recommendations, including illustrative interpretations of the specific requirements in part II. The recommendations are presented as suitable for adoption by Federal agencies engaged in actual plumbing work or in passing upon plans of structures containing plumbing.

Copies of BMS66 are now being sold by the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 20 cents.

EFFICIENCY OF CHIMNEYS

The performance of conventional brick chimneys and of prefabricated designs suitable for low-cost house construction is to be studied in the Bureau's Heat

Transfer Section, under the direction of Richard S. Dill.

After preliminary studies with a conventional oil-fired space heater as a source of hot flue gases, a special gas heater, with meters for measuring the gas and air input, has been built. The quantity of heat and the amount of gas can be varied independently over a wide range of temperature and volume. Four draft gages, graduated in thousandths of an inch, have been constructed for measuring the draft in the test chimneys.

Before the efficiency of the chimneys is determined they will be subjected to thorough tests in the Fire Resistance Section to make certain that each design will meet all reasonable safety requirements.

NONREINFORCED MONOLITHIC CONCRETE WALLS

Building Materials and Structures Report BMS61 gives the results of tests on 24 specimens representing two nonreinforced monolithic wall constructions. The constructions were alike except that the proportions of the concrete were not the same.

Compressive, transverse, impact, concentrated, and racking loads were applied to the specimens, simulating the loads to which the walls of an actual house may be subjected. Three like specimens were tested under each condition. The deformation under load and the set after its removal were measured for each increment of load. The results are presented in graphs and in a table.

Copies of BMS61 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

STRUCTURAL PROPERTIES OF PORTLAND CEMENT ASSOCIATION'S CONCRETE FLOOR CONSTRUCTION

The latest report in the Building Materials and Structures series BMS62, which was released a short time ago, deals with tests made at the Bureau on specimens of precast joist concrete floor construction submitted by the Portland Cement Association.

As in similar work previously described in this Bulletin, the specimens were loaded in such a way as to simulate actual service, and for each loading condition three samples as nearly alike as possible were tested.

Transverse, impact, and concentrated loads were applied, and measurements

were made of deformations and sets for each increment of load.

To insure maximum convenience in use, the results are presented both in graphical and tubular form, and the special features of this type of floor construction are made clear by drawings and photographs.

Copies of BMS62 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

PHYSICAL PROPERTIES OF STONE AS INDICATORS OF FROST RESISTANCE

Most of the domestic building stones are so resistant to frost action that an actual laboratory determination on any particular sample is a lengthy and tedious process. A simpler means of judging the resistance of stone to that type of weathering is desirable and three criteria have been used as follows: (1) Comparison of various physical properties, such as strength, porosity, and absorption of the sample in question with the same properties of materials that are known to have high frost resistance; (2) subsection of the sample in question to an artificial freezing test by causing a salt, such as sodium sulfate, magnesium sulfate, or sodium chloride, to crystallize in the pores; (3) determination of saturation coefficients (ratio of pore space filled with water under specified conditions to the total pore space) and assuming that materials having high saturation coefficients are unsatisfactory.

In the Bureau's study of the domestic limestones used for ashlar construction, the physical properties were found to vary over a wide range. A few samples showed absorptive properties similar to those of the usual grades of common brick, but most were less absorptive and some had extremely low absorption. The comparative frost resistance of these samples was determined by freezing specimens while free to drain, and thawing in water, the cycle being continued to destruction. The frost resistance of samples from different sections proved to be even more variable than such physical properties as strength, porosity, and absorption.

Recent studies on these limestones have been made to determine the degree of correlation existing between certain easily determined properties and frost resistance. These include rate of absorption, rate of drying, saturation coefficients, flexural strength, and compressive strength. Saturation coefficients

were determined for specimens immersed in water for 1 hour, 1 day, 2 days, and for 5 hours of boiling, as well as for the modification of this method referred to above. Within a limited range, some of these properties showed satisfactory correlation with frost resistance for samples of like characteristics. For instance, the coefficient expressed by the absorption during 48 hours of cold immersion to that of 5 hours' boiling, when applied to all samples of limestone (from one region) which failed in less than 500 cycles, showed a correlation of 0.89 (perfect correlation=1). For the same samples, the saturation during a 1-hour cold-immersion absorption test showed a correlation of 0.93. There was some correlation between the compressive strength and frost resistance, and also between the flexural strength and frost resistance for samples that failed in less than 1,000 cycles. For samples of higher resistance, none of these criteria showed satisfactory correlation with the results of freezing tests.

THERMAL EXPANSION OF CLAY BUILDING BRICK

The thermal expansions of 139 building bricks, representative of clay products manufacturers in the United States, were measured over a temperature range from 20° to 120° F. Ranges and average values of the coefficients of thermal expansion are summarized in the following table:

Kind of brick	Coefficients of thermal expansion, millionths per ° F	
	Range	Average
Clay brick	2.4 to 6.9	3.3
Shale brick	2.6 to 3.8	3.5
Fire-clay brick	1.7 to 2.6	2.2

The coefficients for 90 percent of the clay and shale bricks were between 2.7 and 3.9 millionths per °F. Data reported by other investigators indicate that some fire-clay brick have larger expansivities than the hard-burned specimens measured in this investigation; otherwise, the values given herein are in agreement with those previously reported.

The coefficients of thermal expansion were not consistently related to transverse or compressive strength or to the water absorptions of the bricks.

SODIUM ALUMINATE AND ATMOSPHERIC EFFECTS ON PROPERTIES OF A FLINT CLAY REFRACTORY

In this investigation, three refractory mixes were studied. Mix A contained 93.55 percent of Kentucky flint clay and 6.45 percent of Tyrone plastic clay. The flint clay portion consisted of 55 percent which passed the No. 4 and was retained on the No. 10 sieve, and 38.55 percent which passed through a No. 100 sieve. Mix B differed from A in that it contained 0.75 percent of sodium aluminate ($\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3$) (SiO_2). Mix F differed from B in that the flint-clay portion consisted of 20 percent which passed the No. 4 and was retained on the No. 10 sieve, and 73 percent which passed through a No. 20.

Specimens of each of these three mixes were heated to 1400°C under oxidizing conditions for 25 hours and for 105 hours, and under reducing conditions for 105 hours. Determinations of the CO_2 content were made during each burn for purposes of atmosphere control within the furnace.

The results of tests of five specimens showed: (1) The modulus of elasticity and strength were much lower for specimens heated 25 hours (oxidizing) than when they were heated for 105 hours in either a reducing or an oxidizing atmosphere; (2) the sodium aluminate caused the modulus of elasticity and strength of the specimens to be greatly decreased regardless of atmospheric conditions; (3) the sodium aluminate also caused the extensibility of the specimens to be greatly increased; and (4) the specimens heated for 105 hours under reducing conditions showed both greater strength and modulus of elasticity than did those heated in an oxidizing atmosphere for a similar period of time.

NEW AND REVISED PUBLICATIONS ISSUED DURING JANUARY 1941

Research Papers²

[Reprints from the November 1940 Journal of Research]

RP1341. Absolute pressure calibrations of microphones. Richard K. Cook. Price 5 cents.

² Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents per year; Journal of Research, \$3.50 per year (to addresses in the United States and its possessions, and to

RP1342. Recombination and electron attachment in the F layers of the ionosphere. Fred L. Mohler. Price 5 cents.

RP1343. Combination of wool protein with acid and base: The effect of temperature on the titration curve. Jacinto Steinhardt, Charles H. Fugitt, and Milton Harris. Price 10 cents.

RP1345. A multipurpose photoelectric reflectometer. Richard S. Hunter. Price 10 cents.

Building Materials and Structures Reports²

[Persons who wish to be notified of new publications in the Building Materials and Structures series as soon as they are available should write to the Superintendent of Documents, Government Printing Office, Washington, D. C., asking that their names be placed on the special mailing list maintained by him for this purpose.]

BMS61. Structural properties of two nonreinforced monolithic concrete wall constructions. Herbert L. Whittemore, Ambrose H. Starg, and Douglas E. Parsons. Price 10 cents.

BMS66. Plumbing manual. Report of Subcommittee on Plumbing, Central Housing Committee on Research, Design, and Construction. Price 20 cents.

Simplified Practice Recommendations²

R41-40. Package sizes for agricultural insecticides and fungicides. (Supersedes R41-38.) Price 5 cents.

Technical News Bulletin²

Technical News Bulletin 285, January 1941. Price 5 cents. Annual subscription, 50 cents.

MIMEOGRAPHED MATERIAL

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC617. Measurement of the reflectance of manila rope fiber. (Supersedes LC393.)

LC619. Standards and specifications for building and construction materials, fixtures, supplies, and equipment. (Supersedes LC570.)

LC620. The Model State Law on Weights and Measures. Adopted by the National Conference on Weights and Measures and recommended by

countries extending the franking privilege); other countries, 70 cents and \$4.50, respectively.

the National Bureau of Standards for enactment by the States.

LC621. Railway track scale testing service of the National Bureau of Standards, fiscal year 1940 (July 1, 1939 to June 30, 1940).

LC622. Building regulation: Publications issued by the National Bureau of Standards.

LC623. Weights of coal.

LC624. List of Commercial Standards, revised to January 2, 1941. (Supersedes LC609.)

RECENT BUREAU ARTICLES APPEARING IN OUTSIDE PUBLICATIONS²

The Munsell color system—foreword. Deane B. Judd. J. Optical Soc. Am.

² These publications are not obtainable from the Government. Requests should be sent direct to the publishers.

(175 Fifth Ave., New York, N. Y.) 30, 574 (December 1940).

An analysis of the Munsell color system based on measurements made in 1919 and 1926. Kasson S. Gibson and Dorothy Nickerson. J. Optical Soc. Am. 30, 591 (December 1940).

What metals can be deposited from aqueous solutions? William Blum. Mon. Rev., Am. Electroplaters Soc. (93 Oak Grove Ave., Springfield, Mass.) 27, 923 (December 1940).

Effect of speed of pulling jaws on the tensile strength and stretch of leather. Robert B. Hobbs. J. Am. Leather Chemists Assn. (Ridgway, Pa.) 35, 715 (December 1940).

Discussion of paper by C. G. Goetzel on properties of hot-pressed and sintered copper powder compacts. W. H. Swanger. Trans. Am. Soc. for Metals (7016 Euclid Ave., Cleveland, Ohio) 28, 929 (December 1940).